

Fig. 1

Fig. 2

CHONDROGENIC LINEAGE

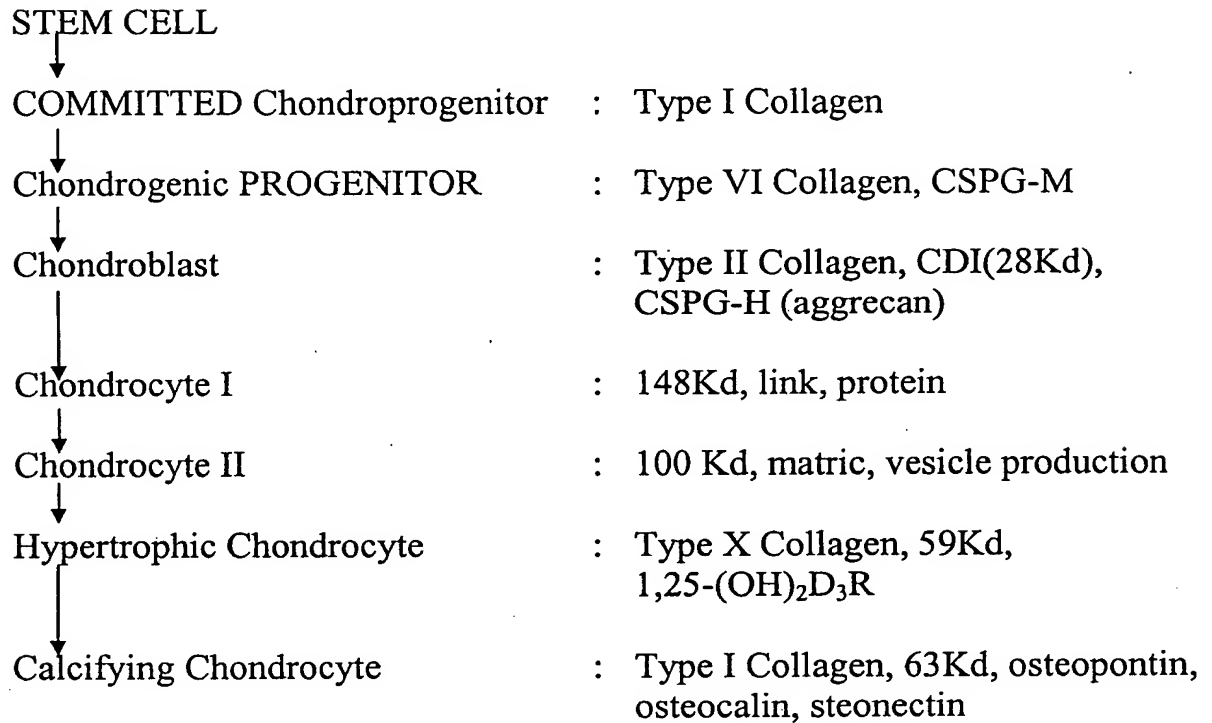


Fig. 3A

Sequence of CZF-1 (cDNA)

```

50
AATGGAGCGAAGACCATGGGGACTGAGTACACAGATGAAGACACAGAAGC
100
ATAGAGAGGATAAGTAATCACTAGCAAGTGGGAAGAACCGGGATTTCAGATC
150
CAGAACAGGCTGACTCCAGAGTCACTGGCTGTCATGTAGTTTCCTCAACT
200
ACTGCCTCAGCTCTACAATCCCAGAGTAAAGCTCTTCTCAAATGAAGAG
250
CCAGGAAGAGGTAGAGGTGGCAGGAATTAACTTTGTAAAGCCATGTCCC
300
TGGGTTCCTGACTTTTCACAGATGTGGCCATAGACTTTTCCCAAGATGAA
350
TGGGAGTGGCTGAATCTTGCTCAGAGAAGTTTGTACAAGAAGGTGATGTT
400
AGAAAACCTACAGGAACCTAGTTTCAGTGGGTCTTTGCATTTCTAAACCAG
450
ATGTGATCTCCTTACTGGAGCAAGAGAAAGACCCTTGGGTGATAAAAGGA
500
GGGATGAACAGAGGCCTGTGCCCAGACTTGGAGTGTGTGTGGGTGACCAA
550
ATCATTATCTTTAAACCAGGATATTTATGAAGAAAAATTACCCCCGGCAA
600
TCATAATGGAAAGACTTAAAAGCTATGACCTTGAATGTTCAACATTAGGG
650
AAAAACTGGAAATGTGAAGACTTGTTTGAGAGGGAGCTTGTAACCCAGAA
700
GACACATTTTAGGCAAGAGACCATCACTCATATAGATACTCTTATTGAAA
750
AAAGAGATCACTCTAACAATCTGGGACAGTTTTTCATCTGAATACATTA
800
TCTTATATAAAACAGATTTTTTCCCATGGAAGAGAGAATATTTAATTTCA
```

Fig. 3B

850
TACAGATAAGAAAAGCTTAAAAACACATTCAGTTGTGAAAAACACAAGC

900
AAGACCGTGGAGAAAAGAACTTTTAAAATGTAATGACTGTGAGAAAATA

950
TTCAGCAAAATCTCAACCCTTACTCTTCACCAAAGAATTCATACAGGAGA

1000
GAAACCCTATGAATGTATTGAATGTGGAAAGGCCTTTAGCCAGAGTGCCC

1050
ACCTTGCTCAACATCAGAGAATACACACAGGAGAAAAACCTTTTGAATGT

1100
ACTGAATGTGGGAAAGCCTTCAGCCAGAATGCTCATCTTGTTCAACACCA

1150
GAGAGTTCATACTGGAGAGAAACCTTATCAGTGTAAGCAGTGTAATAAAG

1200
CATTCAGCCAGCTTGACACCTTGCTCAACATCAGAGGGTCCACACTGGA

1250
GAGAAACCCTATGAATGTATTGAATGTGGGAAGGCTTTTAGTGATTGCTC

1300
ATCCCTAGCTCATCATCGAAGGATTCACACTGGGAAAAGACCTTATGAAT

1350
GTATTGACTGTGGGAAAGCTTTCAGGCAGAATGCTTCTCTTATACGTCAT

1400
CGGCGATATTATCATACTGGAGAGAAACCCTTTGACTGTATTGATTGTGG

1450
GAAGGCTTTCACTGATCACATAGGACTTATTCAGCATAAGAGAATTCATA

1500
CTGGAGAGAGACCTTACAAATGTAATGTGTGTGGGAAGGCTTTTAGCCAT

1550
GGCTCATCTCTGACAGTACATCAGAGAATTCATACAGGAGAGAAACCTTA

1600
TGAATGCAATATCTGTGAGAAAGCCTTCAGCCATCGTGGGTCTCTTACTC

Fig. 3C

1650
TTCATCAGAGAGTTTCATACTGGAGAGAAACCCTATGAATGTAAAGAATGT

1700
GGGAAAGCTTTCGGCAGAGCACGCATCTGGCTCATCATCAGAGAATTCA

1750
TACTGGAGAGAAACCTTATGAATGTAAGGAATGCAGCAAAACCTTCAGCC

1800
AGAATGCACACCTCGCGCAGCATCAGAAAATACACACTGGGGAGAAGCCT

1850
TATGAATGTAAGGAACGTGGTAAGGCCTTCAGTCAGATTGCACACCTTGT

1900
TCAGCACCAGAGAGTTTCATACTGGTGAGAAGCCTTACGAATGTATTGAAT

1950
GTGGGAAGGCCTTTAGTGATGGCTCATATCTTGTTCAACATCCGAGACTC

2000
CACAGTGGCAAAAGACCGTATGAATGTCTTGAATGTGGGAAGGCATTCAG

2050
GCAGAGGGCATCCTTGATTTGTCATCAGAGATGTCATACTGGTGAGAAAC

2100
CTTATGAATGTAATGTTTGTGGGAAAGCCTTTAGCCATCGTAAATCCCTT

2150
ACTCTGCATCAGAGAATTCATACAGGAGAGAAACCTTATGAGTGTAAGGA

2200
ATGTAGCAAAGCCTTCAGCCAGGTTGCCCATCTTACTCTACATAAGAGAA

2250
TTCATACTGGAGAAAGGCCCTATGAGTGTAAGAATGTGGAAAAGCCTTC

2300
AGGCAGAGTGTAATCTTGCTCATCATCAGCGAATTCATACCGGAGAGTC

2350
ATCAGTTATTCTCTCCTCTGCCCTCCCATAACCACCAAGTCCTATAGATTCT

2400
AATCTCGTAAATGCTTCTAGCATCCATCTGCTTTTTTCCAGCACATGTCC

Fig. 3D

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2450
CATCATCATAGTCCAAGACGCAACCATCTCATCTGGATTTCTGCAGTAGC

2500
ATAACTGTTGCCCCCTTTTGCTTCTATCAACTACATGTTTAACACTGTAGG

2550
CAGCCTAACCTTTTAAAAATAAAAATACATAATTTATGTTATTTTCCCAT

2600
TTAAAACACTTGATTTGAAAAATATATTAATAATCCATTTCAAGGATT

2650
AGCACACACTGGCATATAGTTATTGCTAAATAAATGCTAGCCATTAAGGT

2666
AAAAAAAAAAAAAAAAAA
```

KRAB-A KRAB-B

MKSQEEVEVAGIKLCKAMSL GLSLTFDVAIDFSQDEWEWLNLAQRSLYKKVMLENYRNLVSV GLCISKPDVISLLEQ

EKDPWIKGGMNRGLCP DLECVWTKSLSLNQDIYEELPPAIIMERLKSYDLECSTLGKNWKCEDL FERELVNQKT

HFRQETITHIDTLIEKRDHSNKS~~GT~~VFHLNTLSYIKQIFPMEERIFNFHTDKKSLKTHSVVKKHKQDRGEKLLKCN

ZF-1 ZF-2 ZF-3

OCEKIFSKISTLTLHQRIHTGEKPYEC IECGKAFSQAHLAQHORIHTGEKPFECTECGKAFSQAHLVQHQRVHTG

ZF-4 ZF-5 ZF-6

EKPYQCQCNCASFQLAHLAQHQRVHTGEKPYEC IECGKAFSDCSSLAHHRRIHTGKRPYEC IDCGKAQRNASLIR

ZF-7 ZF-8 ZF-9

HRRYYHTGEKPFDC IDCGKAFTDHIGLIQHRIHTGERPYKCNVCGKAFSHGSSLTVHQRIHTGEKPYEC NICEKAF

ZF-10 ZF-11

SHRGSLTLHQRVHTGEKPYECKECGKAQRQSTHLAHHQRIHTGEKPYECKECSKTF SQAHLAQHQIHTGEKPYEC

ZF-12 ZF-13 ZF-14

KERGAFSQIAHLVQHQRVHTGEKPYEC IECGKAFSDGSYLQHPRLHSGKRPYEC LECGKAQRQASLICHQRCHT

ZF-15 ZF-16 ZF-17

GEKPYECNVCGKAFSHRKSLTLHQRIHTGEKPYECKECSKAFSQVAHLTLHKRIHTGERPYECKECSKAFRQSVHLA

HHQRIHTGESSVILSSALPYHQVL*

Fig. 4

KRAB-A

MTD GLVTFRDVAIDFSQEEWECLDPAQRDLVVDVMLENYSNLVSL DLESKTYETKKIFSENDIFEINFSQWEMK

ZF-1

DKSKTLGLEASIFRNNWKCKSIFEGLGKHQEGYFSQMIISYEKIPSYRKSKSLTPHQRIHNTEKSYVCKEKGK

ZF-2 ZF-3

ACSHGSKLVQHERHTAEKHFECKEKGKNYLSAYQLNVHQRFHTGEKPYECKEKGKTF SWGSSLVKHERIHT

ZF-4 ZF-5 ZF-6

GEKPYECKEKGKAFSRGYHLTQHQQIHI IGVKSYPYCKEKGKAF FWGSSLAKHEI IHTGEKPYCKEKGKAFSR

ZF-7 ZF-8

GYQLTQHQQIHTGKKPYECKICGKAFCWGYQLTRHQIFHTGEKPYECKEKGKAF NCGSSLIQHERIHTGEK

ZF-9 ZF-10 ZF-11

YECKEKGKAFSRGYHLSQHQQIHTGEKPF ECKEKGKAF SWGSSLVKHERVHTGEKS HECKEKGKTF CSGYQLT

ZF-12

RHQVFHTGEKPYECKEKGKAF NCGSSLVQHERIHTGEKPYECKEGRLLVVAITLLNIRK IPVRNLSNVRNV

GRPSVGVQA *

Fig. 6

Fig. 5A

Sequence of CZF-2 (cDNA)

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                                                                 50
GGGAGTTCTTGCAATTCCAGAACCATGACTGATGGGTTGGTGACATTCAG

                                                                 100
GGATGTGGCCATCGACTTCTCTCAGGAGGAGTGGGAATGCCTGGACCCTG

                                                                 150
CTCAGAGGGACTTGTACGTGGATGTAATGTTGGAGAACTATAGTAACTTG

                                                                 200
GTGTCACTGGATTTGGAGTCAAAAACGTATGAGACCAAAAAATATTTTTC

                                                                 250
AGAAAATGATATTTTTGAAATAAATTTTTCCAGTGGGAGATGAAGGACA

                                                                 300
AAAGTAAAACCCTTGGCCTTGAGGCATCCATCTTCAGAAATAATTGGAAG

                                                                 350
TGCAAAAGCATATTCGAGGGACTAAAAGGACATCAAGAGGGATACTTCAG

                                                                 400
TCAAATGATAATCAGCTATGAAAAAATACCTTCTTACAGAAAAAGTAAAT

                                                                 450
CTCTTACTCCACATCAAAGAATTCATAATACAGAGAAATCCTATGTTTGT

                                                                 500
AAGGAATGTGGGAAGGCTTGCAGTCATGGCTCAAACTTGTTCAACATGA

                                                                 550
GAGAACTCATAACAGCTGAAAAGCACTTTGAATGTAAAGAATGTGGGAAGA

                                                                 600
ATTATTTAAGTGCCTATCAACTCAATGTGCATCAGAGATTCATACTGGT

                                                                 650
GAGAAACCCTATGAGTGTAAGGAATGTGGGAAGACCTTTAGCTGGGGATC

                                                                 700
AAGCCTTGTTAAACATGAGAGAATTCACACTGGTGAGAAACCCTATGAAT

                                                                 750
GTAAAGAATGTGGGAAGGCCTTTAGTCGTGGCTATCACCTTACCCAACAT

                                                                 800
CAGAAAATTCATATTGGTGTGAAATCTTATAAATGTAAGGAATGTGGGAA
```


Fig. 5B

850
GGCCTTTTTTTGGGGCTCAAGCCTTGCTAAACATGAGATAATTCATACAG

900
GTGAGAAACCTTATAAATGTAAAGAATGTGGGAAGGCCTTCAGTCGTGGC

950
TATCAACTTACTCAGCATCAGAAAATCCATACTGGTAAGAAACCTTATGA

1000
ATGTAAAATATGTGGAAAGGCTTTTTGTTGGGGCTATCAACTTACTCGAC

1050
ATCAGATATTTCACTGGTGAGAAACCCTATGAATGCAAGGAATGTGGG

1100
AAGGCTTTTAATTGCGGATCAAGTCTTATTCAACATGAAAGAATTCATAC

1150
TGGTGAGAAACCTTATGAATGTAAAGAATGTGGAAAGGCCTTTAGTCGTG

1200
GCTATCACCTTTCTCAACATCAGAAAATCCATACTGGTGAGAAACCTTTT

1250
GAATGTAAGGAATGTGGGAAGGCCTTTAGTTGGGGTTCAAGCCTTGTTAA

1300
ACATGAGAGAGTTCATACTGGTGAGAAATCCCATGAATGTAAAGAATGCG

1350
GAAAGACCTTTTGTAGTGGGTATCAACTTACTCGACATCAGGTATTTTAC

1400
ACTGGTGAGAAACCCTATGAATGTAAGGAATGTGGGAAGGCCTTTTAATTG

1450
TGGATCAAGCCTTGTTCAACATGAAAGAATCCATACAGGGGAGAAACCCT

1500
ATGAATGTAAAGAATGTGGAAGGCTTTTAGTCGTGGCTATCACCTTACTC

1550
AACATCAGAAAATTCATACCGGTGAGAAACCTTTCAAATGTAAGGAATGT

1600
GGGAAGGCCTTCAGTTGGGGTTCAAGCCTAGTTAAGCATGAGAGAGTCCA

Fig. 5C

```

1650
TACTAATGAGAAGTCTTATGAATGTAAAGACTGTGGGAAGGCCTTTGGTA

1700
GTGGCTATCAACTTAGTGTTTCATCAGAGATTTCATACTGGTGAGAAGCTT

1750
TATCAACATAAGGAATTCGGGAAGACCTTTACTCGTGGCTCAAACTTGT

1800
TCATGAGAGAACTCATAGTAATGATAAACCTACAAATATAACGAATGTG

1850
GGGAAGCCTTTCTGTGGACAACTTACTCAAATGAGAAAATTGATACTGAT

1900
GAAACCTTATGATTGAAAGTTGTAAAAGAATATTTTGTGTGTGCGTATAG

1950
ACAACTTATCATAATAAGAACTCTTACTCTTGAGAAACCTTGTGAATGTA

2000
AGGGTTGTGCAAAAGCCATTCATTTCTGTTTATGGGCAATTATCTTGCTA

2050
TCCAGCAATTCATACTAGTGAGAAATATTTTGAATATAATTAATATGAAA

2100
AGGCCTTTAGACTTCTGTACAGTCTTATTGGATATCAATTTATACTGATG

2143
TAAAATCATTTAAATGAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
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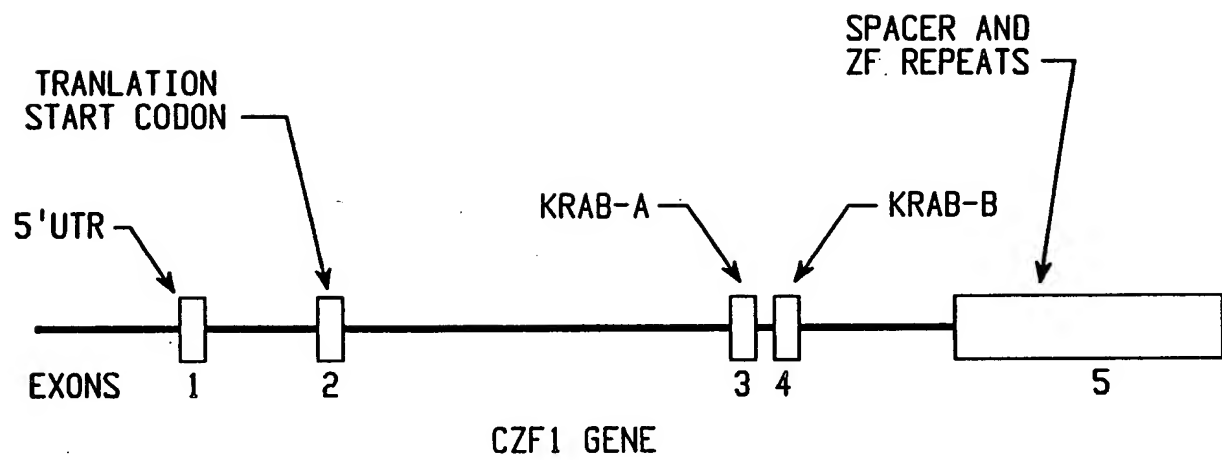


Fig. 7

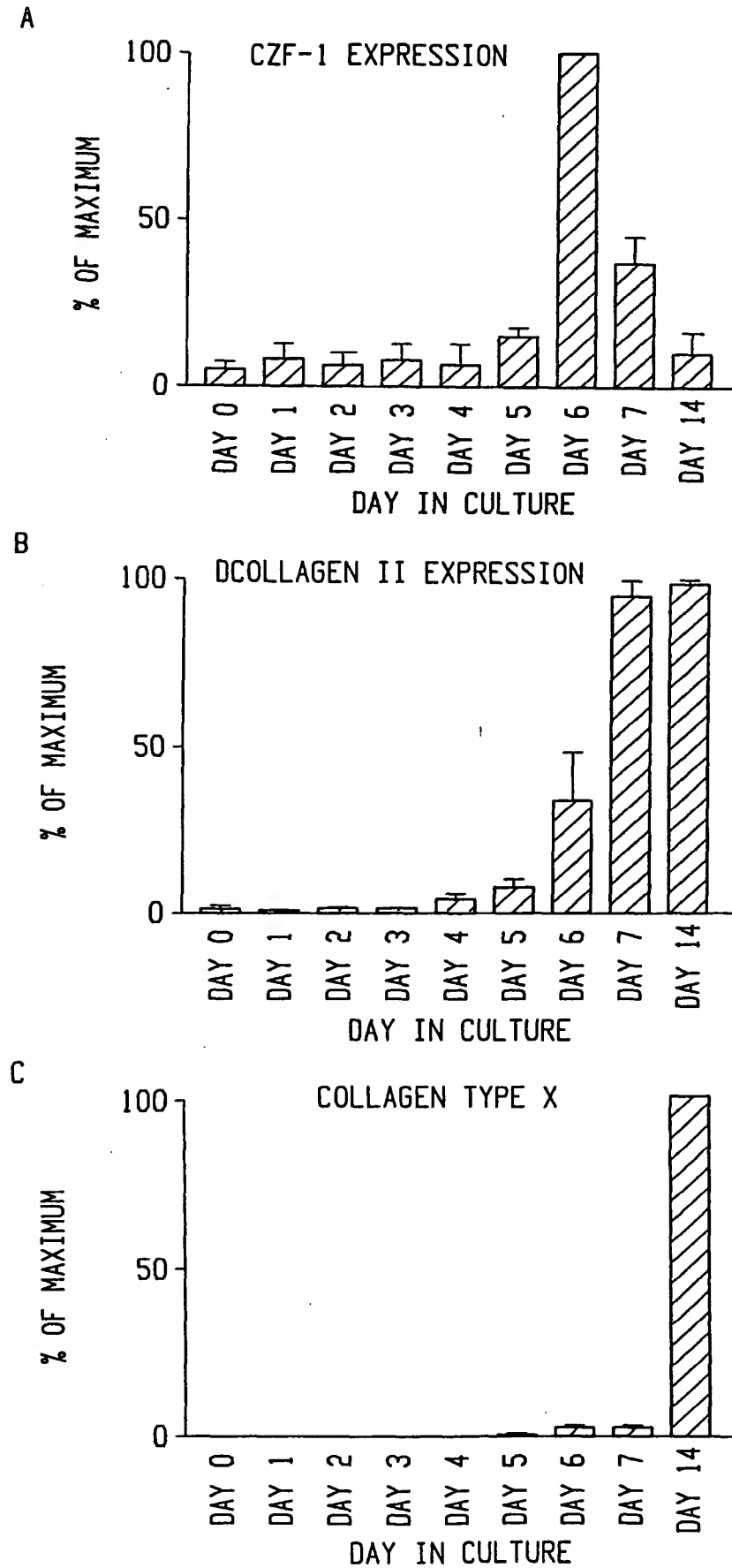


Fig. 8

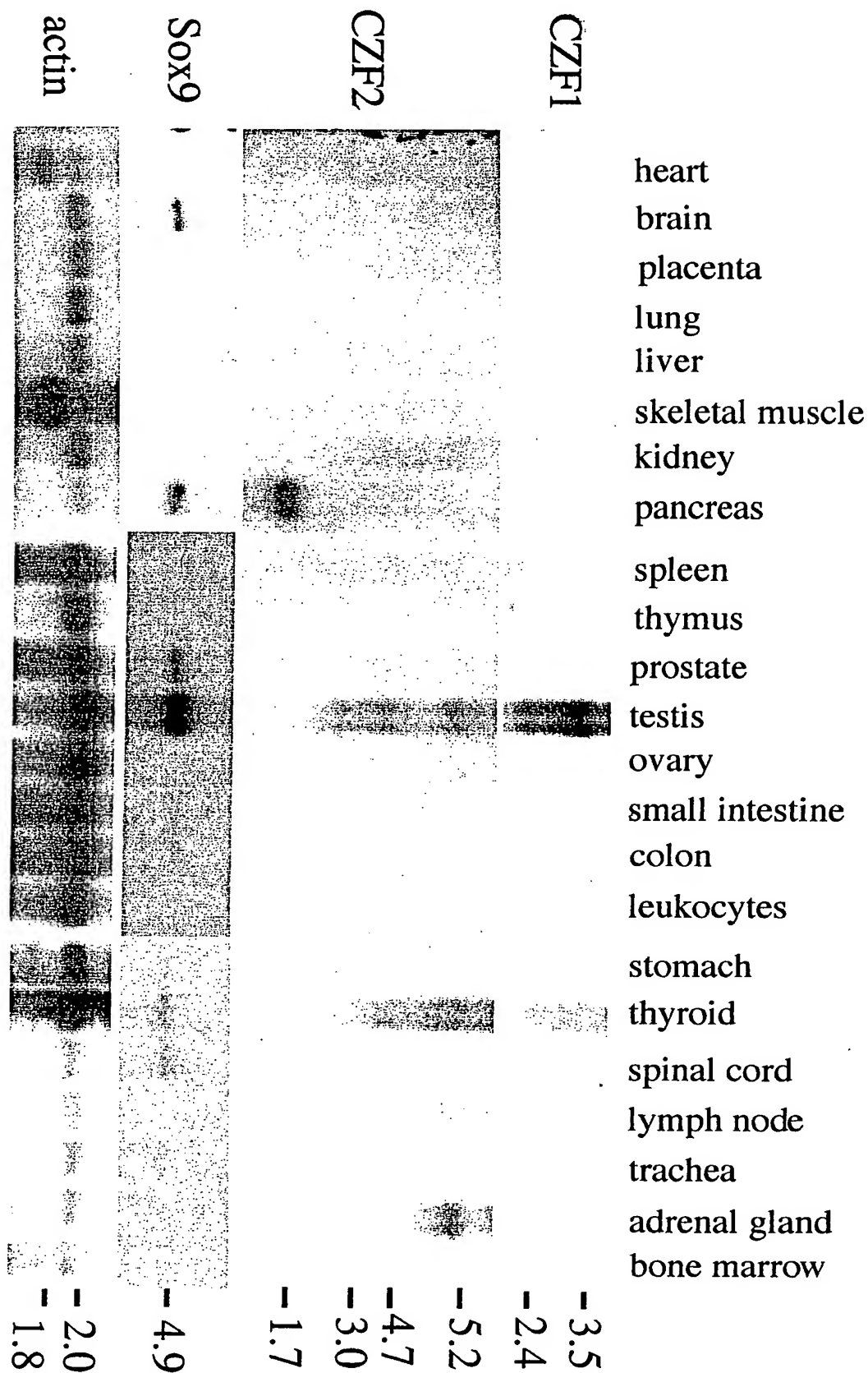


Fig. 9

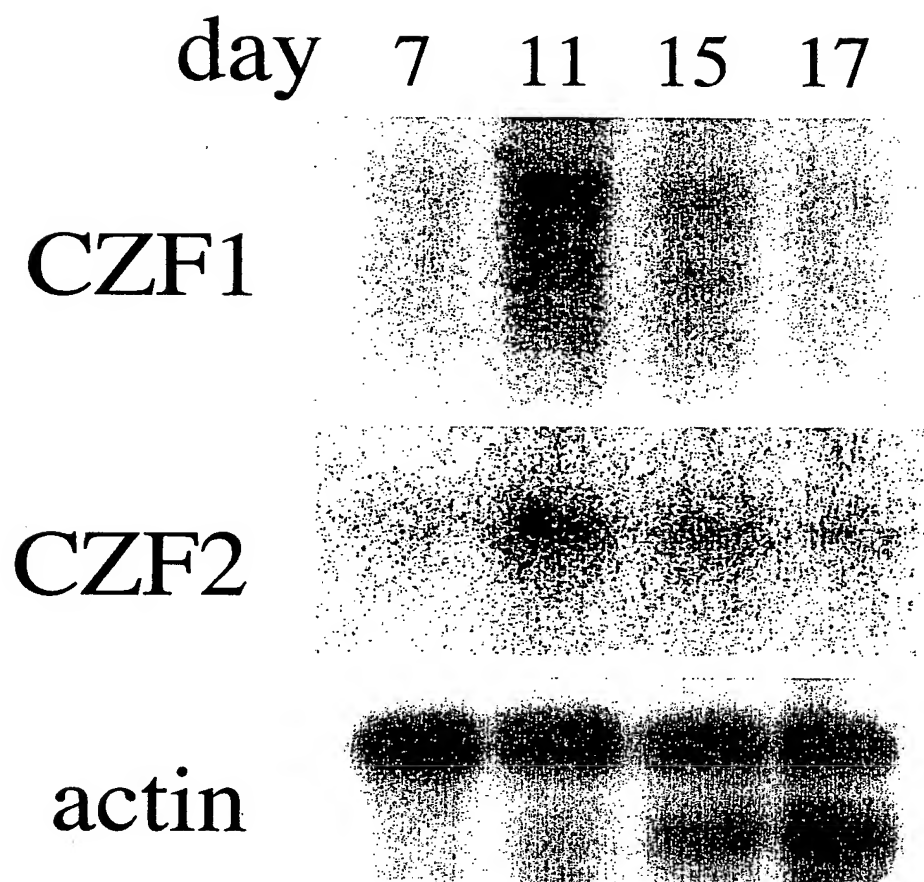


Fig. 10



head mesenchyme
(hm)
first branchial
arch (b1)
second branchial
arch (b2)
forelimb bud (fb)
tail bud (tb)

Fig. 11